Model depicts data from sonar monitoring of TMI core

by Rita Scott, EG&G Idaho

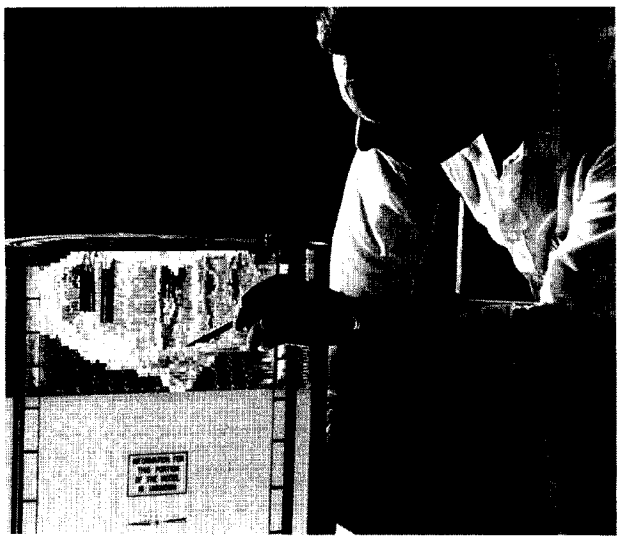
A Plexiglas model, depicting the cavity in the Three Mile Island Unit 2 damaged reactor core, has been built from data obtained with an acoustic sonar device lowered into the reactor last summer by EG&G Idaho engineers.

The two-part model, which will be used to document the extent of the core damage after the accident and assist planners preparing to defuel the core, is a three-dimensional display of topographical maps developed from one-half million pieces of data provided by the acoustic device and assembled by a computer. Built to scale, the model shows a cavity about 60 inches in depth overall but with depressions as deep as 78 inches and five or six fuel assemblies remaining intact in the core.

The EG&G Idaho engineers adapted existing technology to design and conduct the acoustic mapping information gathering task, with the cooperation and assistance of General Public Utilities Nuclear, the plant owner, and funding from the Department of Energy, according to Mike Martin, EG&G Idaho project manager.

The inch-and-a-half acoustic device, with six pairs of transducers set in fixed positions at various angles, was lowered into the core through the entry used for the video camera "quick look" in 1982. Beginning just below the grid of the reactor's upper plenum and ending six inches above the core rubble bed, the search head was lowered one inch, rotated 360 degrees, then lowered again. Two thousand data points were collected by the computer at each level.

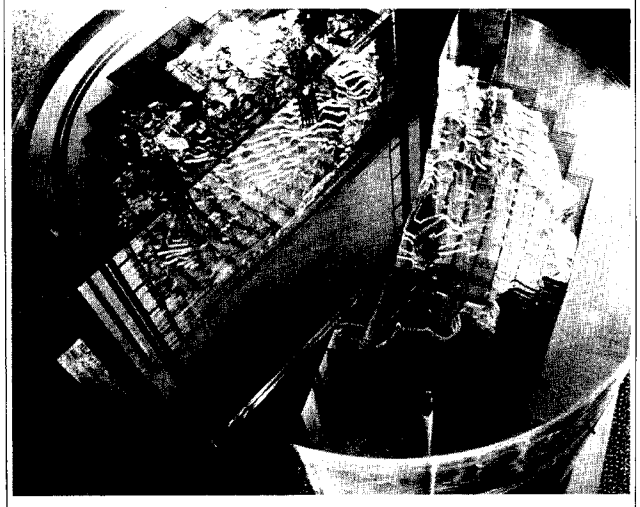
Martin said the device operated similar to the sonar used by naval vessels at sea. Focused, acoustic beams measured the distance between the device and the boundaries of the cavity at numerous locations, including the roof and floor. As a result, the device was able to "see" up under some fuel assemblies suspended from the upper plenum that initially had blocked the view of the video camera, and thus give researchers a more accurate three dimensional picture of the interior of the reactor.



MIKE MARTIN, EG&G Idaho project manager, points out the deepest part of the cavity in the TMI Unit 2 damaged core. While the model is not representative of the core itself, Martin says each Plexiglass plate, shown in tiers in the model, reflects two-inch intervals of sonar gathered information. (Photo by Ron Paarmann, EG&G Idaho.)

The company's Computer Aided Design (CAD) system was used to generate the maps from the refined data.

The experiment was designed and conducted by Larry Beller, Steve Taylor, Val Klingler, Bruce Kaiser, Joe Holm, NDE Engineering Branch; John Bower, Mechanical Engineering; and Dick Meininger, TMI/TIO. David Tow, Technical Support Division, compiled the information to produce the mappings, Martin says.



A PLEXIGLASS MODEL physically reproduces the boundaries of the void in the core of the TMI Unit 2 reactor. The model was developed from data compiled during an acoustic mapping information gathering task. (Photo by Ron Paarmann, EG&G Idaho.)

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